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Interrogation Outcomes and Linguistic Style Matching

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Interrogation Outcomes and Linguistic Style Matching

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Abstract

Interrogation Outcomes and Linguistic Style Matching

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Cooperation is an important aspect of investigative interviews and is usually obtained through rapport-building during questioning. The specific strategies used vary between interviewers, but nonetheless involves actively engaging with the interviewee. Previous research on behavioral mimicry has found that there is a positive association between rapport and mimicry. The current study looked at the relationship between linguistic mimicry and interrogation outcome. Specifically, the interrogations that were analyzed were of professional polygraph examiners questioning subjects about whether cheating occurred during a trivia game. Results showed partial support for deceptive non-confessions matching more at the beginning of the interrogation compared to confessions. Also, there was evidence that linguistic matching increased from pre-confession to post-confession and those confessions that that were initially deceptive tended to increase in mimicry as the interrogation progressed. Results and implications are discussed.

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Chapter 1: Introduction

Interviews are an important aspect of learning about a stranger, while investigative interviews (i.e. interrogations) involve the gathering of accurate information in order to determine the guilt of a suspect in relation to a crime. During interviewing, investigative or not, it is important to gather enough reliable information to come to an accurate conclusion about the character of the interviewee, which sometimes requires the detection of deception. This is why it is important for law enforcement and management to understand why certain interviews end successfully (e.g. coming to an accurate conclusion about the interviewee) and others do not.

Previous research on deception detection has found that the average deception detection accuracy among the general public seems to be only slightly better than chance and law enforcement don't seem to do much better, regardless of the level of expertise (Aamodt & Custer, 2006; Bond & DePaulo, 2006; Hartwig, Granhag, Strömwall, & Vrij, 2004). Low deception detection accuracy undermines investigative interviewers' ability to uncover the truth. However, since most previous studies have only looked at passive observation instead of active questioning, it is possible that the questions that were asked during these studies weren't useful.

There have been multiple studies that have examined the effect of interview questions on deception detection (Levine, Blair, & Clare, 2013; Levine, Shaw, & Shulman, 2010; Vrij et al., 2008). These studies provide some evidence that simply asking the right questions can increase judgment accuracy. Therefore, it is possible that

trained interrogators can achieve higher deception detection rates if allowed to interview the person of interest themselves. This could be because of the specific questions they ask, the manner with which they ask the questions, or the close proximity that allows them to experience certain behaviors that passive observers may not.

The way questioning progresses and how the interlocutors interact during this progression can be used to predict the outcome of the interaction. How the interviewees perceive the vocal and body language of the interviewer can affect how they choose to cooperate and how honest they will be. On the other hand, the way the interviewee answers the questions can influence how the interviewer asks the questions. According to Communication Accommodation Theory (CAT; Giles, 1973; Coupland & Giles, 1988) an individual's behavior will adapt depending on whether s/he wants to assimilate or dissimilate with those individuals s/he is interacting with. This can happen on a conscious or unconscious level, and is influenced by many factors including likability, attraction, similarity, and affiliation. In the context of an interview, if interviewees are feeling comfortable with their interviewer they might start to exhibit similar body and verbal language. Specifically, this study uses previous findings on linguistic mimicry, and a measure of engagement termed linguistic style matching (LSM; Niederhoffer & Pennebaker, 2002), to determine the relationship between linguistic convergence and interrogation outcomes.

Chapter 2: Literature Review and Hypotheses

INTERROGATION STRATEGIES AND SUCCESS

Ideally, interrogations are structured to gather as much information about a situation of interest as possible in order to come to an accurate conclusion, but the reality does not always achieve this idea. There are many ways one can conduct an interrogation, but there have only been a few standardized procedures used in recent past. One popular method used all over the United States is the Reid Technique, which is composed of nine different steps meant for obtaining a confession (Inbau & Reid, 1962). Before actually beginning the nine-step procedure, investigators are supposed to conduct an interview that is meant to gather the maximum amount of information about the suspect, while detecting any deception that may be present. This already brings up a large issue, that deception detection is much more difficult and inaccurate than law enforcement care to admit, and there are plenty of studies to back up that claim (Aamodt & Custer, 2006; Bond & DePaulo, 2006). Additionally, police tend to hold inaccurate beliefs about deception (Vrij & Taylor, 2003), supporting the claim that the pre-interrogation interview is flawed. Regardless, it is still used in the Reid technique to determine the guilt of the suspect.

The nine steps are predicated on an assumption that the interviewee is guilty of a crime, which leads the interrogator to pursue a confession, whether the guilt is genuine or not. This assumption will result in a genuine denial being tossed aside as a lie or all suspicious behaviors being considered a confirmation that the suspect is truly guilty. Additionally, if suspects keep insisting that they are innocent, the interrogator will

continue questioning until a confession is produced or enough information is gathered to confirm the suspect's innocence. The issue with constant harassment from the interrogator is that it can result in a false confession. Imagine being questioned for hours on end. At what point would you give in and falsely confess? 2 hours? 6 hours? Studies have found that most interrogations take 30 minutes to 2 hours (Kassin et al., 2007; Leo, 1996), while those interrogations that end in a false confession are much longer (Drizin & Leo, 2004). Specifically, Drizin and Leo (2004) found that out of 125 false confession cases, the average time spent in the interrogation room was 16.3 hours. At that duration, interviewee fatigue is highly likely as well as a greatly diminished cognitive ability to deny the accusations. However, if interrogators could determine the likelihood that the suspect would confess earlier on in the interrogation, they would save time and reduce the chance of inducing a false confession.

Other than the assumption of guilt, the Reid technique also uses several different questioning strategies to induce confession, one of which is related to the thesis of this study. Minimization is a framing technique used to convey the social acceptability of the crime, with the goal that it will make the suspect more comfortable confessing. In other words, minimization occurs when the interrogator starts framing the crime as acceptable in the eyes of the suspect, offering situational factors as an excuse for committing the crime. For example, the interrogator might talk about how an unfortunate financial situation is a perfectly reasonable excuse for stealing, especially if the victim is a large department store that is owned by a large corporation. Providing these types of excuses allows the suspect to agree with the interrogator and ultimately agree with the

accusations. A significant component of this strategy is rapport building with the suspect, which in turn increases the degree of comfort a suspect is likely to experience in confessing. Showing compassion and empathy by seemingly understanding the reasons for committing the crime can be very persuasive. However, if suspects see through the false empathy, they will likely close up and distance themselves from the failed attempt by the interrogator, otherwise they will start agreeing and warmly accept the excuses given to them.

Although at face value it may seem useful, this strategy makes it easy for the suspect to falsely confess. Russano (2005) found that this minimization strategy induced a surprisingly high number of false confessions. Subjects completed a team problem-solving task with a partner (a confederate), but were told that there were also several problems that had to be solved without team collaboration. During the "individual" questions, confederates either sat silently or asked the subject for help, violating the study instructions. Afterwards, the experimenter interviewed the subjects. The results showed that minimization reached a peak 87% rate of true confessions when offered with a deal (81% without a deal), but unfortunately the rate of false confessions increased even more substantially (18% without a deal; 43% with a deal). Similarly, other studies on false confession rates using different Reid technique steps haven't provided much evidence to support its integrity (Gudjonsson & Pearse, 2011; Kassin & Kiechel, 1996; Kassin, Appleby, & Perillo, 2011).

Because there have been a number of studies on the problematic strategies used in the Reid technique, policy in the U.K. have shifted more towards a non-accusatory form

of interrogation represented by the acronym PEACE ("Preparation and planning", "Engage and explain", "Account", "Closure", and "Evaluate"). This model was proposed by the Royal Commission on Criminal Justice in 1993 as an alternative interrogation procedure mainly focused on the gathering of relevant information, not confessions (Kassin et al., 2011). Several groups of researchers have agreed that the PEACE model is the structure they see fit for investigative interviewing mainly because of its non-confrontational nature and the lower false confession rates compared to the Reid technique (Gudjonsson & Pearse, 2011; Kassin et al., 2011; 2010). Importantly, rapport building seems to be an important aspect of both interrogation models.

Besides these two standardized interrogation procedures, researchers have examined different types of questioning strategies that could aid in the detection of lies and truths. One study attempted to induce more transparent lying (i.e. easier to detect) by asking individuals to recall an event in reverse (Vrij et al., 2008). Although the detection accuracy of the technique was significantly greater than chance, 56% accuracy is not a particularly large effect, especially since average deception detection accuracy is approximately 54% (Bond & DePaulo, 2006). Levine (2010) conducted a series of studies to determine the effectiveness of direct probing rather than indirect circumlocution and using background questions. Subjects were interviewed after finishing a trivia game where they had an opportunity to cheat. The questions were structured in a way that tested whether they induced lie transparency (i.e. easy to detect deception), which was measured by the deception detection accuracy of observers. In

other words, asking questions such as “did you cheat” induced lie transparency more than “what happened in the room?”

Similarly, certain questions increased transparency and raised the average detection accuracy of passive observers to 65.2% for students and 68.5% for experts (e.g. “what would your partner say?”), while other questions caused anxiety to manifest in both honest and deceptive answers (e.g. “why should I believe you?”) reducing accuracy to 47.7% in students and 40.9% in experts (Levine et al., 2013). Using the above questioning examples, asking about the hypothetical answers that a suspect’s partner might give allows the interviewer to test the suspect’s certainty about their own story. If s/he displays uncertainty, then it’s likely that s/he is lying. By contrast, asking why the suspect should be believed results in similar nervous behavior for both liars and truth tellers, making it more difficult for the interviewer to distinguish between the two groups. These studies provide evidence that asking the right questions, compared to solely relying on the leakage of deceptive cues, were enough to increase peoples’ accuracies. However, it is possible that active questioning compared to passive observation would result in even higher accuracies for both the interviewer and observer.

When researchers take on the task of manipulating questions in order to force liars to be more transparent, they lack the experience that most professional interrogators have obtained through years of practice. In light of this limitation, studies have been conducted on interrogators and how their personal questioning styles affect their own and observers’ detection accuracy. One such study had British police officers interrogate university students who engaged in a mock-crime using any questioning method they wanted

(Hartwig et al., 2004). Officers were asked to rate the veracity of the subject they personally questioned and to rate subjects via video recording (an interrogation other than their own). The results indicated that in-person and observation accuracies were no better than chance. Several questioning characteristics (e.g. number of interruptions, number of open vs. close-ended questions, word count) were recorded to determine if certain strategies yielded better accuracy and it was found that there were no significant relationships between strategy and accuracy.

There are two main problems with the methodology of this study. The first is that the local police officers' training could be different in content than professional, federally trained officers. The strategies that police learn could be less in-depth than those used by federal agents, thus reducing their effectiveness. Additionally, local law enforcement probably doesn't experience the level of expertise involved in federal cases, thus not allowing them to learn and progress. The second issue is that the researchers may not have looked at the right aspects of the questioning styles.

Very few researchers get a chance to examine federally trained interrogators' questioning styles. Whatever the reason, it is important to explore why some interrogators are successful while others are not. In order to answer this question, one must first understand how accurate professionals can be when they are allowed to question the person of interest themselves. Levine and colleagues (2014) had federal interrogators question students that had the chance to cheat during a trivia game. The researcher found that the professionals were able to induce a genuine confession 85% of the time, leaving only six liars (out of 89 total interviews), and were 97.7% accurate at determining if

someone cheated, only missing two out of the 89 interviews. This study shows that experts can achieve high levels of success in detecting deception. However, this high accuracy can be attributed to the low number of liars (6.7%), but this is only true because the interrogators were able to get a high rate of confessions.

What are interrogators doing right to achieve this high detection rate? Abbe and Brandon (2012) emphasize that rapport is an important part of many different professional interactions (e.g. doctor-patient), and investigative interviewing is no different. As mentioned earlier, both the Reid technique and the PEACE model use rapport and "kindness" towards the interviewee as a tool for determining the truth. Being able to build a sense of connection, real or not, can be a powerful tool in the interrogation room and interrogators are aware of this (Kassin et al., 2007). Although rapport is important, very few studies have investigated its power and the outcomes it produces (Abbe & Brandon, 2012).

Communication Accommodation Theory and Linguistic Matching

When people interact with others they like, or are willing to cooperate with, they tend to exhibit more similar behavior to their interactants. Whether it is verbal or nonverbal, research has found that when conversational partners, or group members, hold positive perceptions of each other their behavior begins to synchronize. This type of phenomenon is explained by communication accommodation theory (CAT; Giles, 1973; Giles, Taylor, & Bourhis, 1973). This theory states that individuals will alter their verbal and nonverbal behavior to either match a group they want to be associated with or differ from a group they want to be distinguished from. Note that this does not necessarily mean

that behavior is consciously changed. It may very well be the case that interlocutors are unaware of their behaviors converging on one another. In the context of an interrogation, when suspects are being questioned, they will experience certain feelings toward the interrogator that will likely govern how they will behave.

According to CAT, there are two main factors that will determine how the interviewee will act (Soliz & Giles, 2014). Convergence is when one's behavior is changes to resemble the behavior of the person or group one wants to be associated with. An example would be an interlocutor crossing her legs when she sees her friend doing so. Divergence, on the other hand, emphasizes behavioral differences between the self and other. Simply, convergence and divergence are just two poles on the same dimension, at least in terms of behavioral similarity. Thus both are important to consider when looking at interrogations because convergence could signify rapport and trust building, while divergence could be a result of guarding or unsuccessful questioning.

In the past, research on convergence has examined both verbal and nonverbal behaviors as an indicator or behavioral accommodation. There are different terms used to describe behavioral convergence, but I will use the term *mimicry*. Previous research on nonverbal mimicry has found that it is related to rapport building (Tickle-Degnen & Rosenthal, 1987). These findings show that people who have matching nonverbal behavior also experience a sense of connection with the person they are interacting with. The chameleon effect is another way researchers have framed non-conscious nonverbal mimicry, which is when someone unknowingly matches the body language of the person they are interacting with (Chartrand & Bargh, 1999). Specifically, they found that non-

conscious mimicry increases rapport and likability, which happens to result in more mimicry. The non-conscious aspect of the chameleon effect can have important ramifications in the interrogation room.

Imagine a questioning session where a suspect is guilty and the interrogator is constantly pushing for a confession. The suspect doesn't appreciate the bashing, and as a result doesn't like interacting with the interrogator, but nonetheless is slowly being persuaded by the interrogator to tell the truth. The suspect might be consciously fighting the interrogator, but also might be unconsciously matching the interrogator's behavior, signaling an inevitable confession as long as the interrogator is aware of the matching. On the other side of the dimension could be honest/deceptive non-confessors.

Verbal mimicry seems to also be related to interactional outcomes. Specifically, researchers have looked at different types of verbal mimicry and their relation to persuasiveness. For example, when language intensity (e.g. *extremely, best of all*) was manipulated in a way that resembled the intensity of the subject, speakers were perceived as more persuasive (Aune & Kikuchi, 1993). Similarly, when the speech rate of a speaker was manipulated to be similar to the listener, the speaker was seen as more attractive and persuasive (Buller & Aune, 1992). Both of these studies demonstrated how increased verbal similarity causes a speaker to seem more persuasive, which can be very useful for interrogators. The more persuasive they appear, the more likely they will be able to convince the suspect to confess.

Adjacent to persuasiveness is trust. An interrogator will have a difficult time obtaining a confession if the suspect doesn't believe that the interrogator has their

interests at heart. Researchers tested whether *lexical mimicry* (i.e. similar word choice) could also be a predictor for trust, rather than persuasiveness. Unlike Aune and Kikuchi (1993) who looked at language intensity, Scissors (2008) recorded the language use in online chat sessions and measured the perceived trust between interlocutors. The researchers found that lexical mimicry was significantly associated with trustworthiness. That is, the more the interlocutors' language matched, the more they tended to trust each other. Overall, research seems consistent when it comes to verbal mimicry, but only recently has a standardized measure of linguistic mimicry been created.

Language style matching (LSM; Niederhoffer & Pennebaker, 2002) is a way of measuring verbal engagement and has been found to be related to relationship initiation, cooperation, and successful negotiations (Gonzales, Hancock, & Pennebaker, 2010; Ireland et al., 2011; Taylor & Thomas, 2008). Niederhoffer and Pennebaker (2002) were the first to create an automated analysis of linguistic mimicry using 16 different word categories that have been previously established as reliable (Pennebaker & King, 1999). Some of these lexical categories included positive/negative emotion words (e.g. good, bad), social words (e.g. family, friends), insight (e.g. think, know), certainty (e.g. always, never), as well as the overall word count and words with six or more letters. These categories were calculated using a computerized program called Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, & Francis, 2007), which tallied the number of times these words were used, resulting in frequency counts for each category. Once these frequencies were obtained, Niederhoffer and Pennebaker simply calculated a correlation coefficient for each lexical category between interlocutors and compared them to self-

reported interaction quality, as well as an outside judge's perception of interaction quality. This was meant to capture any association between linguistic mimicry and likability. What they found was that linguistic mimicry wasn't related to likability. The authors point out that the matching of language could be due to engagement, not comfort per se.

Another way to interpret these findings is that language matching might have a curvilinear relationship with engagement. In other words, people engage with each other when they enjoy the company, or they engage with each other when they are arguing, both scenarios involve listening and responding throughout the interaction. In the interrogation room, however, it is unclear when engagement would emerge, but it is expected that if someone is innocent and does not plan to confess s/he will most likely disengage with the interrogator because s/he has no incentive to convince the interrogator that s/he is being honest. This is in contrast to how a liar would act since s/he is trying to be convincing, or how a confessor would act since s/he feels comfortable enough to incriminate him/herself.

More recently, LSM has taken a form that can be applicable in any context. Gonzales and colleagues (2010) decided to focus more on functions words such as pronouns, articles, and prepositions since they are frequently used and are present in all contexts (Chung & Pennebaker, 2007). They are also processed quickly and outside of awareness (Pennebaker & King, 1999), making them much harder to actively manipulate during an interaction (Gonzales et al., 2010). Because the bulk of behavioral mimicry research has claimed that it can be influenced consciously, LSM provides a way of

measuring linguistic mimicry that cannot be consciously altered and can provide more discrete insight into the progress of an interaction.

Linguistic style matching not only has the ability to predict group dynamics or relational initiation (Gonzales et al., 2010; Ireland et al., 2011), but has also been found to predict more severe outcomes. Taylor and Thomas (2008) used LSM to see if it was related to outcomes of police negotiations. As predicted, successful negotiations had higher LSM scores compared to unsuccessful ones. For example, negotiations in which a police officer and hostage takers matched in language choice were more likely to end without violence than others that didn't linguistically match. They also looked at linguistic style matching on a turn-by-turn basis and over time. They found that police officers were more likely to be the dominant speakers (i.e. hostage takers matched the language of police, not the other way around) and that successful negotiations had very little variation in language matching throughout the interaction, while unsuccessful negotiations tended to fluctuate between high and low LSM. The fluctuation could speak to the unstable nature of the interaction, resulting in mistrust between the negotiator and hostage taker.

The most relevant study to the current one was a linguistic style matching analysis of police interrogations by Richardson (2014). The researchers collected 64 transcripts of Canadian police interrogating suspects about a variety of crimes ranging from robbery to homicide. Their results were slightly different from those reported by Taylor and Thomas (2008). Conversational level LSM did not significantly predict interrogation outcome, which is not surprising considering that they only knew whether the suspect confessed or

not. They did not know whether the suspect lied or whether there were any false confessions. Previous research has found that deception influences the language of the liar, as well as the listener, despite the fact that the listener doesn't realize that he is being lied to (Hancock, Curry, Goorha, & Woodworth, 2008). This finding shows that being able to measure the influence deception has on LSM could be important and needs to be considered when examining interrogations.

Other than conversation level LSM, Richardson and colleagues (2014) also measured LSM at the turn-by-turn level and by calculating the linguistic matching at the utterance level they found that when the conversational "leader" was the interrogator, the suspect was more likely to confess. In other words, the suspects who confessed tended to match the language of the interrogator, rather than the other way around. This is similar to when police negotiators "lead" the conversation and the negotiation is more likely to end successfully (Taylor & Thomas, 2008). Therefore, since research on behavioral mimicry and interactional outcomes shows that similarity in behavior tis associated with trust, persuasiveness, and cooperation (Aune & Kikuchi, 1993; Richardson, Taylor, Snook, Conchie, & Bennell, 2014; Scissors, Gill, & Gergle, 2008; Swaab, Maddux, & Sinaceur, 2011; Taylor & Thomas, 2008), the first prediction is:

H_1: Overall, interrogations that end in a confession will have a higher LSM than interrogations that end in a genuine denial.

However, since there is evidence that language is influenced by a deceptive conversation, but no specific evidence to how it is related to linguistic mimicry, the following questions were asked:

RQ_1: Will deceptive non-confessions differ in LSM from confessions?

RQ_2: Will deceptive non-confessions differ in LSM from genuine non-confessions?

Additionally, Richardson and colleagues (2014) found that the direction of matching (i.e. leadership) mattered, which is consistent with previous research (Niederhoffer & Pennebaker, 2002; Taylor & Thomas, 2008). When suspects match the language of the interrogator it reflects the dominant role that the interrogator holds, which gives them more control over the interaction and more easily allows them to convince the suspect to confess. On the other hand, if the interrogator is matching the language of the suspect it means that the suspect is in the dominant position and might feel less influenced by the interrogator, resulting in less pressure to come clean. Therefore:

H_2 = When the subject matches the language of the interrogator the interrogation will be more likely to end in a confession.

Also, it is highly unlikely that linguistic mimicry in an interaction is static and consistent. Taylor and Thomas (2008) found that an increase in LSM at the end of a police interrogation is indicative of success because more mimicry could signal more engagement, which means more trust in the negotiator and a higher willingness to release the hostages. The same could be expected in the interrogation room. An increase in LSM at the end of the interrogation could signal more engagement, which means more trust by the suspect and a higher willingness to confess. Therefore:

H_3 = Interrogations that increase in LSM will be more likely to result in a confession.

However, it is unclear how LSM will progress through an interrogation and how that progression will influence the outcome. It's possible that certain fluctuations in mimicry at the beginning of the interrogation could be predictive of an impending confession or it could signify an unwillingness to cooperate, making a confession less likely. To better understand the way LSM changes throughout the interrogation the following question was proposed:

RQ_3: How will LSM change throughout the interrogations and will these changes predict certain outcomes?

Chapter 3: Method

DATASET

In order to test the hypotheses, interview tapes were obtained from Levine and colleagues (2012-2013). In their study, five professional interrogators interview 14-19 students each for a total of 89 students. The interrogators' goal was to determine if the student cheated during a trivia game just prior to the interview.

The trivia game consisted of two partners (one was a confederate) and 10 difficult questions worth $10 a piece, which could potentially end with each player winning $100. The money was placed into two piles in front of the subjects and was removed incrementally when a question was answered incorrectly in order to maximize incentive to win. Placing the money in front of the subjects would remind them of the stakes involved with getting the questions right and possibly motivating them to cheat. The players had 60 seconds to generate an answer and were allowed to interact during this period. After question three, there was a knock on the door, indicating a (staged) emergency for the trivia master, which resulted in him/her leaving and forgetting the money and the answers in the room with the players. At this point the players had a choice, cheat or don't cheat. Because one of the players was a confederate, they were put into one of three conditions. In one condition, the confederate didn't acknowledge the possibility of cheating, but would have if their partner (the true subject) initiated it. The second condition was the confederate bringing up the possibility of cheating, but only followed through with it if their partner joined them. In the third condition, the confederate cheated whether or not their partner agreed, putting the partner in a situation

of forced involvement. After a couple of minutes the trivia master returned and finished the game.

After the game was concluded the true subject was brought into a room for an interview about the trivia game. The subject was told that the interview was meant to better understand the team dynamics involved in the trivia game. The interviewers were professional interrogators who worked for one of two federal agencies (the subjects were not made aware of the occupations of their interviewers). They were informed of the trivia game, but were not told whether cheating occurred or who did the cheating if any occurred. They were given freedom to question the subjects using any questioning strategies they chose. The interrogators were aware that the trivia questions were difficult, which helped them understand the context of the interviewees' responses.

After the conclusion of the interview (which was recorded from the interrogator's point of view), the subjects were debriefed and compensated $10 for their participation if they cheated, and $10 per correct answer if no cheating occurred (for a possibility of $100 if all 10 questions were answered correctly). Permission to use subjects' data was obtained from them during the debriefing. Finally, the interrogators were asked whether they thought cheating occurred, and if it did occur, who specifically cheated (confederate only or both).

TRANSCRIPTION AND CODING

In order to analyze the language use of subjects and interrogators, the audio for each interview was stripped from the video (and therefore any identifiable information) and transcribed. Six subjects did not grant permission for their data to be used, so the

total number of interviews used in the current analysis was 83. Transcribers were instructed to record every word the interlocutors said, including stutters and fillers such as *mhm* or *um*, while excluding partial words *cont-* and laugher. Partial words were excluded because of the uncertainty involved in recording them. For example, *wa-* could be *was*, *wasn't*, *want*, or *what*.

Additionally, there were instances where the two speakers' turns overlapped and the speech was hard to parse. Here transcribers were instructed to choose the dominant speaker (e.g. the one who continued talking after the other stopped), because both turns during this turn-taking battle were not always audible and speakers were hard to identify.

Transcribers were also told to record any instance when the subject explicitly mentioned that they were suspicious of the experimental setup (e.g. *I knew that the guy leaving was part of the experiment*), and also the exact instance the subject confessed so pre- and post-confession linguistic matching could be calculated and compared.

MEASURING LINGUISTIC STYLE MATCHING

Niederhoffer and Pennebaker (2002) first introduced the possibility of measuring linguistic matching by using 16 different word categories that have been found to have good reliability over time (Pennebaker & King, 1999). More recently, however, linguistic matching has been measured exclusively using function words (Gonzales et al., 2010; Ireland et al., 2011). Because function words are the most used type of word and happen to be the most unnoticed part of language (Chung & Pennebaker, 2007), they are expected to be the most useful in measuring engagement between the interrogator and subject.

Gonzalez and colleagues (2010) describe functions words as the "syntactic backbone of language (pg. 5)" and emphasize the importance of using them in the measurement of linguistic mimicry. Similar to past research (Gonzales et al., 2010; Ireland et al., 2011; Richardson et al., 2014), the equation used here took nine function word categories for each speaker and created a measure of mimicry that ranged from 0 to 1. For example, to calculate linguistic matching for personal pronouns the function was:

$$LSM_{pprn} = 1 - \left(\frac{|pprn_1 - pprn_2|}{pprn_1 + pprn_2} + 0.0001\right)$$

The nine function words included personal pronouns (e.g. *I, he, we*), impersonal pronouns (e.g. *it, those*), articles (e.g. *the, an*), prepositions (e.g. *at, for*), auxiliary verbs (e.g. *am, have*), adverbs (e.g. *exactly*, *nervously*), conjunctions (e.g. *and, but*), negations (e.g. *no, never*), and quantifiers (e.g. *few, some*). Once all categories were calculated, they were averaged together to obtain the overall linguistic style matching (LSM) score.

Table 1. Mean LSM Scores for each Category and Total LSM

Category	Mean	Standard Deviation
Personal Pronouns	0.90	0.07
Impersonal Pronouns	0.86	0.10
Articles	0.85	0.12
Prepositions	0.88	0.08
Auxiliary Verbs	0.93	0.05
Adverbs	0.90	0.07
Conjunctions	0.89	0.08
Negations	0.53	0.17
Quantifiers	0.79	0.20
Total	0.84	0.05

The next step was to break down each interrogation into parts in order to measure change in LSM throughout the interview. There are several different ways a police interrogation could unfold, but according to the Reid Technique and PEACE model, the number of steps that actually occur during the interrogation could range between three and eight (excluding preparation and evaluation of the information that was obtained). In order to determine the necessary number of parts to use, the current interviews were broken down into sections of questioning.

The first questions (part 1) interrogators tended to use were aimed at building rapport and were about the subject's school and personal life (e.g. *So why did you choose this school?)*. Immediately afterwards (part 2), interrogators began to ask questions about the trivia game. These questions were intended to subtly shift focus towards the relevant situation, but without directly accusing the subject of any misconduct. If the subject mentioned the trivia master leaving the room, the interrogator began to focus in on the moment of interest (i.e. the opportunity to cheat) by asking the subject to describe what happened when the trivia master left the room. On the other hand, if the subject neglected to mention the trivia master leaving the room, the interrogator would bring this up him/herself. At this point a subject who cheated might confess.

Next (part 3), the interrogator directly questioned the subject about cheating (e.g. *Did cheating occur?*). After this the interrogator would start to probe to gather more details (part 4). This included asking who suggested cheating, who touched the folder, who looked at the folder, and who used the answers, all of which are supposed to aid the interrogator in determining who cheated. The final moments of the interrogation (part 5) involved asking clarification questions. This allowed the interrogator to poke any holes in the initial story and allow the subject to confess, if s/he hadn't already.

Since the interrogators seemed to break their questions into five parts, the interviews were divided into five sections. In order to do this each interview was divided into turns, which were summed for each speaker, and divided into six sections. Initially, interviews were divided into five, but it turned out that the last section would have a very low LSM score because that section would frequently end with the interrogator

explaining how s/he was going to get the researcher to begin the debrief, while the subject would simply acknowledge the interrogator. For example:

> Interrogator: *All right. Well what I'm going to do is I'm going to turn off the video, then the researchers going to come in and wrap up the debrief, it only takes like maybe another minute or so, okay?*
>
> Subject: *Okay*.

Note that each part does not necessarily mean the interrogator was using the aforementioned questioning strategy, but the analysis did provide a look at how linguistic mimicry changed throughout the interview. Also, each part does not correspond to a temporal segment of the interview. For example, part two does not necessarily mean that two minutes passed in the interview.

The final step of preparation was to compare the language use at the utterance level. Niederhoffer and Pennebaker (2002) described this analysis as a more accurate reflection of the coordination in a conversation. In terms of an interrogation, being able to analyze language at the utterance level could help determine if a confession is a result of the interrogator or the suspect leading the conversation (Richardson et al., 2014). In order to do this each interrogation was broken down by turn and two separate LSM scores are calculated. To determine the LSM score when the interrogator leads the interrogator's first turn was compared to the subject's first turn, the interrogator's second turn compared to the subject's second turn, and so on. To calculate LSM when the subject leads the conversation the subject's first turn is compared to the interrogator's second turn, and so on. For example:

Interrogator Led LSM

$Interrogator_1$ vs. $Subject_1 = LSM_1$

$Interrogator_2$ vs. $Subject_2 = LSM_2$

Subject Led LSM

$Subject_1$ vs. $Interrogator_2 = LSM_1$

$Subject_2$ vs. $Interrogator_3 = LSM_2$

After scores were calculated for each scenario (interrogator and subject led) for each interrogation, the scores for each scenario were averaged to obtain two aggregate LSM scores for each conversation (see Richardson et al., 2014).

However, since everything the speakers said was recorded, including fillers, it presented a potential issue when calculating linguistic matching at the utterance level. If a speaker spoke for an extended period of time, once in a while the second speaker would respond with some form of acknowledgment such as *ok* and the first speaker would continue talking. The utterance level LSM for this type of exchange was extremely low. Herbert Clark (1996) described fillers as "track-two" or non-business language (e.g. *um*). Track-two language is essentially communication about the communication, such as acknowledging that the listener is still listening, but not necessarily adding anything to the conversation. This type of language was distinguished from "track-one" or business, which is the main focus of the conversation. During an interrogation, track-one would be the suspect describing their whereabouts the night a crime took place and track-two would be the interrogator constantly responding with *uh huh* to signal to the suspect that s/he is still listening. Being able to remove a conversational turn that only contained

track-two language could yield different results in the utterance level analysis. To control for this possibility two types of analyses were conducted, one that included turns that only contained track-two language (e.g. *yeah uh huh ok*) and one that excluded those turns:

Track-Two Included

Interrogator: *But um what what I want to do is I want to ensure that you know I'm interviewing you right now to get your side of the story and um then I'm going to interview him and what I usually like to do is I like to post and let everyone know upfront that aspect so that they don't kinda shoot themselves in the foot because a lot of the times people come in here and they're a little iffy about "what do I say how much do I say" and then the other person comes in and just throws them under the bus…*

Subject: *Yeah*. (**Track-Two**)

Interrogator: *You know so there's you know the whole aspect of cheating is natural*.

Track-Two Excluded (Combined turn in ***bold italics***)

Interrogator: *But um what what I want to do is I want to ensure that you know I'm interviewing you right now to get your side of the story and um then I'm going to interview him and what I usually like to do is I like to post and let everyone know upfront that aspect so that they don't kinda shoot themselves in the foot because a lot of the times people come in here and they're a little iffy about what do I say*

how much do I say and then the other person comes in and just throws them under the bus ***you know so there's you know the whole aspect of cheating is natural***.

Subject: *I mean I wasn't thinking about it but…*

In order to account for any changes in LSM as a result of track-two removals, analyses were re-run for overall LSM, "temporal" LSM, and pre/post confession LSM, in addition to the utterance level analysis.

Chapter 4: Results

Out of the 83 transcripts analyzed, 38 documented interviews in which subjects (45.8%) cheated, and out of those individuals 32 confessed and 6 lied throughout the entire interview; because of this large difference between groups, all findings between liars and the other outcomes should be considered with caution. Fifty-three percent (n = 44) of the subjects were female. Sixty-three subjects were Caucasian (75.9%), 11 were African American (13.3%), eight were Asian (9.6%), and one identified as Hispanic (1.2%). There were five different experts that each interviewed at least 14 subjects and at most 19. Table 2 has a full list of descriptive statistics.

Before beginning the primary analyses, two preliminary analyses were conducted. First, word count was compared between outcomes in order to determine if certain outcomes were a result of interrogation length. An analysis of variance (ANOVA) was used to compare the mean word count of confessions ($M = 1697.66$, $SD = 661.58$), non-confessions ($M = 1677.67$, $SD = 786.26$), and deceptive non-confessions ($M = 2174.83$, $SD = 547.73$), and the differences were statistically insignificant, $F(2, 80) = 1.27$, $p = .29$. However, it was also considered that out of those who confessed, some may have lied pre-confession, meaning these individuals were liars, at least up until they confessed. In order to further explore this possibility, each confession transcript was examined for interviewees that denied cheating, but ultimately confessed. The analysis identified 11 liars of the original 32 confessions. An additional ANOVA was conducted between these new groups. The word count did not statistically significantly differ between honest confessions ($M = 1518.00$, $SD = 643.60$), non-confessions ($M = 1677.67$, $SD = 786.26$),

initially deceptive confessions ($M = 2040.63$, $SD = 575.50$), and deceptive non-confessions ($M = 2174.83$, $SD = 547.73$), $F(3, 79) = 2.16$, $p = .10$.

The second preliminary analysis was meant to explore the possibility of suspicion playing a role in the outcome. The number of subjects that explicitly mentioned in their interview that they suspected the scenario was a set-up was recorded ($n = 22$). Then a Chi-Squared test was conducted to determine if certain groups had more suspicious individuals than others. There were no statistically significant differences, $\chi^2(3, n = 83) = 6.62$, $p = .09$. Additionally, an interaction was tested between outcome and suspicion on LSM, which was also statistically insignificant, $F(2, 76) = .12$, $p = .89$. Therefore, suspicion doesn't seem to be related to interrogation outcome and was not considered in subsequent analyses.

The first primary analysis explored whether overall linguistic matching was related to interview outcome. Using an ANOVA, when genuine non-confessions ($M = .84$, $SD = .05$), confessions ($M = .83$, $SD = .04$), and lies ($M = .84$, $SD = .06$) were compared, overall LSM did not significantly differ between the outcomes, $F(2, 80) = .54$, $p = .60$. Another ANOVA was conducted to determine if there were any differences in overall LSM scores between non-confessions ($M = .84$, $SD = .05$), completely honest confessions ($M = .83$, $SD = .04$), initially deceptive confessions ($M = .83$, $SD = .03$), and lies ($M = .84$, $SD = .06$). The differences were statistically insignificant, $F(2, 80) = .40$, $p = .76$. As mentioned earlier, transcripts were also stripped of turns that solely contained track-two language, or fillers (e.g. *yeah ok*) and then re-analyzed to determine if these

turns had an effect on linguistic matching. After removal, the differences were still statistically insignificant, $F(2, 80) = .43$, $p = .73$.

Table 2. Overall LSM Differences

Track-Two	Outcome	*n*	*M*	*SD*
Included	Non-Confession	45	0.84	0.05
	Completely Honest Confession	21	0.83	0.04
	Initially Deceptive Confession	11	0.83	0.03
	Lies	6	0.84	0.06
Excluded	Non-Confession	45	0.84	0.05
	Completely Honest Confession	21	0.83	0.04
	Initially Deceptive Confession	11	0.83	0.03
	Lies	6	0.85	0.06

After analyzing the overall LSM differences it was observed that there could be a change in LSM after the subject confessed, so a post-hoc analysis was conducted to determine if there was a significant change in LSM between pre- and post-confession. Confessions were divided into pre-confession and post-confession portions and paired samples t-tests were conducted. LSM for pre-confessions ($M = .82$ $SD = .06$) were marginally significantly higher compared to post-confessions ($M = .79$ $SD = .06$), $t(31) = 1.94$, $p = .06$. When confessions were divided into those who were completely honest throughout their confession and those who were initially deceptive before finally

confessing, only those who initially lied exhibited a marginally significant change in LSM from pre- (M = .83, SD = .04) to post-confession (M = .79, SD = .05), $t(10) = 2.15$, $p < .06$. After removing turns with fillers, pre-confession LSM (M= .82, SD = .06) was significantly higher than post-confession LSM (M = .77, SD = .08), $t(31) = 2.99$, $p < .01$. More specifically, those who initially lied and then later confessed had significantly higher matching before the confession (M = .84, SD = .04) than after (M = .78, SD = .06), $t(10) = 2.7$, $p < .05$, which is similar to the findings before the removal of fillers. However, compared to pre-filler removal, those who were completely honest before they confessed exhibited a marginally significant difference between pre- (M = .81, SD = .06) and post-confession (M = .77, SD = .08), $t(20) = 1.91$, $p = .07$. It appears that removing the fillers made the differences between pre- and post-confession more pronounced.

Additionally, liars and initially deceptive confessors (before they confessed) were combined to form a larger group of liars, and an ANOVA was run comparing this new group of liars (n = 17) to non-confessors (n = 45) and confessors before they confessed (n = 21). Doing this allowed all groups to be compared to one another with more equal group sizes. The ANOVA indicated significant differences between lies, non-confessions, and confessions, $F(2, 80) = 3.23$, $p < .05$. A Tukey's Post Hoc analysis revealed that non-confessions (M = .84, SD = .05) had higher linguistic matching than confessions (M = .81, SD = .064, $p < .05$), while there were no statistically significant differences between lies and the other outcomes.

In order to determine if change in LSM throughout the interview had an effect on the outcome each interview was separated into five different parts. Based on the number

of turns that were taken and the differences between each outcome were tested at each part. A MANOVA was conducted to determine if LSM differed between outcomes at any of the parts. The overall multivariate test was significant (Wilk's $\lambda = .7$, $F(15, 207.44) = 1.87$, $p < .05$, partial $\eta^2 = .11$) and thus multiple ANOVAs were conducted to determine which part(s) had significant differences between outcomes. Part 2 of the interviews is the only part that had significant differences between groups, $F(3, 79) = 3.15$, $p < .05$, partial $\eta^2 = .10$, with liars having higher LSM ($M = .81$, $SD = .05$, $p < .05$) than confessors, specifically those who were initially deceptive ($M = .65$, $SD = .11$). However, when fillers were removed, although the ANOVA for part 2 remained significant, $F(3, 79) = 3.1$, $p < .05$, Tukey's Post Hoc analysis found the difference between liars ($M = .81$, $SD = .07$, $p = .06$) and initially deceptive confessors ($M = .70$, $SD = .09$) to be only marginally significant.

Figure 1 shows the changes in LSM across interview segments when fillers were included in the analysis, while Figure 2 shows the progression when fillers were removed. Note that although the differences for part 4 were statistically insignificant when fillers were included, when they were removed liars tend to converge on the other groups, while honest confessions and initially deceptive confessions diverge from one another at the end of the interview.

Figure 1. LSM by Part (Fillers Included)

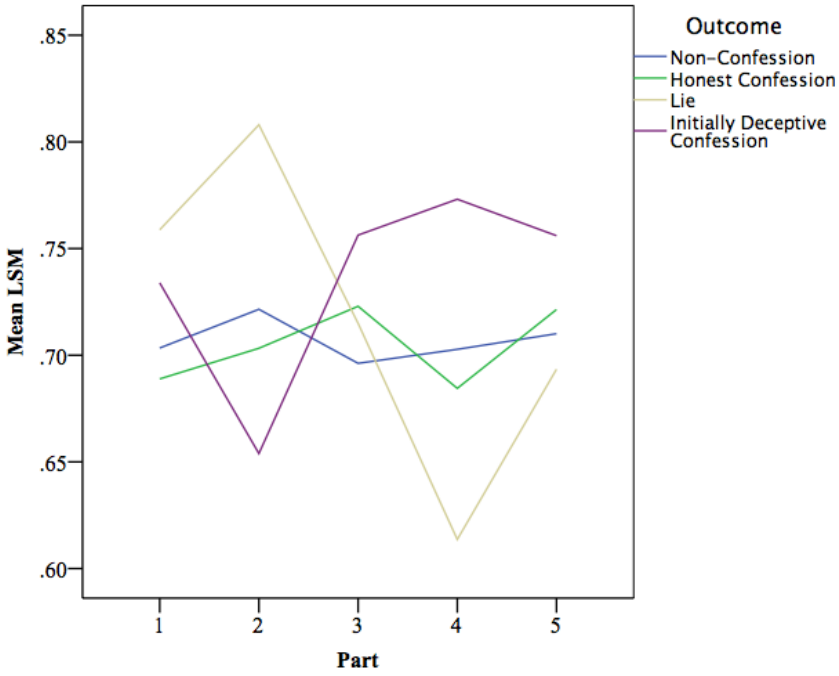
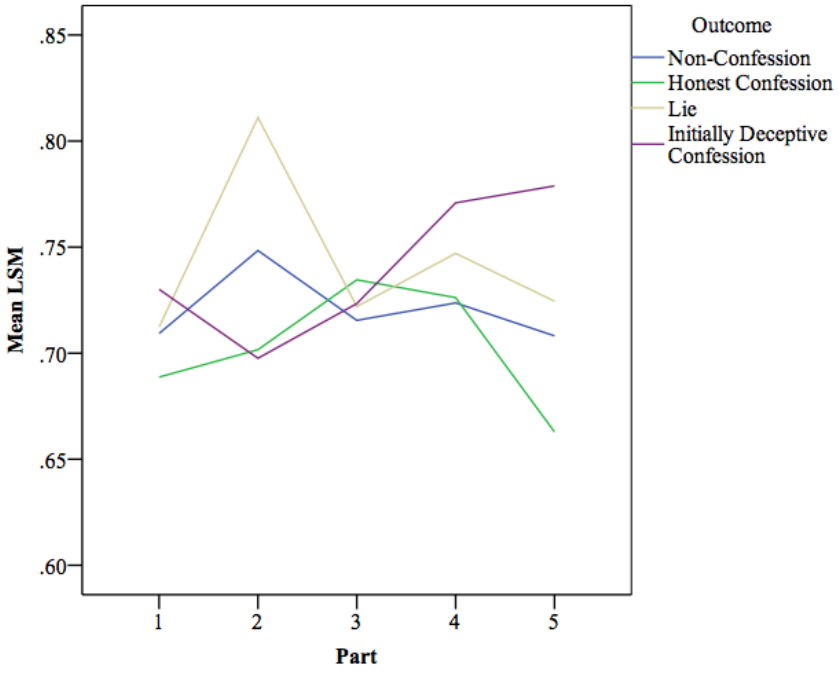


Figure 2. LSM by Part (Fillers Excluded)



Looking at how LSM changed throughout interrogations, it seems that the only outcome that showed any type of trend at the end of the interaction was initially deceptive confessions (see Figure 2). In order to test whether the upward trend of the interrogation was significant Pearson's correlation coefficient was calculated between interrogation part and LSM. LSM was positively associated with part ($r(53) = .28, p < .05$), meaning that as the interrogation progressed linguistic matching for those who were initially deceptive increased. Note that this relationship was only marginally significant when fillers were included in the analysis, $r(53) = .26, p = .06$.

The final analysis examined whether the outcomes could be predicted by comparing interrogator-led LSM and subject-led LSM. After calculating interrogator led and subject led utterance-level LSM scores, a 4 (outcome: non-confession, honest confession, initially deceptive confession, lie) × 2 ANOVA (interrogator led vs. subject led) was conducted. The interaction was insignificant, $F(3, 158) = .30, p = .83$. Additionally, the same analysis was run for transcripts with fillers removed and the results were also insignificant, $F(3, 158) = .15, p = .93$. Whether the interrogator or subject is leading the conversation doesn't seem to affect the outcome of the interview.

Chapter 5: Discussion

General Discussion

There were mixed results found in the current study. There was no support found for there being a difference between confessions and non-confessions in terms of LSM (H_1). There was also no support for H_2, that linguistic leadership in the conversation would predict the likelihood of a confession. Specifically, when the subject matched the interrogator's language s/he was no more likely to confess than when the interrogator matched the language of the subject. There was, however, partial support found for H_3, which predicted that interrogations that increased in LSM would likely end in a confession. Only initially deceptive confessions displayed an upward trend compared to the other outcomes.

In addition to the hypotheses, several questions were addressed. Specifically, it was found that, at the conversation level, lies did not differ significantly from non-confessions and confessions. It was also found that between outcomes, LSM differed during certain parts of the interrogation, but not others. Finally, there was evidence that LSM changed after a confession was obtained, whether the pre-confession conversation was deceptive or honest.

Rapport is considered one of the most important aspects of a successful interrogation because it allows the examiner to gain the trust and cooperation from a suspect (Abbe & Brandon, 2012; Driskell, Blickensderfer, & Salas, 2013). When officers step into the interrogation room to question a suspect, they are, more often than not, seen as an adversary who threatens the suspect's freedom. This is an obstacle that the

interrogator must overcome in order to gain the full cooperation of the suspect in determining their guilt, and one way is to build rapport.

Both the Reid Technique and PEACE model address some form of rapport-building in their questioning strategies. For example, the Reid Technique recommends that the interrogator minimize the severity of the crime's consequences by describing it as a common or socially acceptable action. Downplaying the severity of the crime could be interpreted by the suspect as a "shared understanding", making the interrogator seem less accusatory and more relatable (Abbe & Brandon, 2012). Similarly, the PEACE model's second step instructs the interrogator to engage with the suspect, actively listening and appropriately responding to their statements, keeping accusatory language to a minimum. Doing this will help the suspect feel more comfortable and willing to disclose more accurate information.

The current project explored rapport-building through behavioral matching among interlocutors. Because previous research on verbal and nonverbal matching has found that higher matching is generally associated with more cooperation and positive attitudes towards conversational partners (Soliz & Giles, 2014), it was assumed that behavioral mimicry could be an indicator of a successful interrogation. Additionally, scholars have claimed that coordination is reflected in the rapport that is built through behavioral synchrony (Tickle-Degnen & Rosenthal, 1990).

One of the more interesting ways to examine behavioral synchrony is to examine the extent to which interlocutors' language matches. Where body language can be actively manipulated with a little focus, language is processed automatically, making it

hard to manipulate. Even so, certain types of language can be manipulated, such as content words, which are words related to the topic at hand. These words can be distinguished from function words, which are used to facilitate the delivery of content words (i.e. pronouns, articles, prepositions, etc.) and aid in the understanding of a statement. They are also the most frequently used words in the English language, making up over half of the language we use (Pennebaker, Mehl, & Niederhoffer, 2003). In addition to their ubiquity, function words are also processed largely outside of awareness, making them especially useful since they could reflect unconscious engagement (Pennebaker & King, 1999).

Richardson and colleagues (2014) looked at linguistic matching as a predictor of interrogation outcomes, but unlike the current study, these researchers analyzed local police interrogations on several different types of crimes. Additionally, those researchers didn't have access to the *ground truth* and therefore didn't know if any of the non-confessions were lies. The current study analyzed interviews conducted by professional American interrogators in a controlled experiment, with access to the ground truth and an incident that was consistent across interviews that controlled for outcomes that maybe a result of crime type.

When analyzing linguistic matching at the conversation level, there was no support for the prediction that matching differs between outcomes. This finding is not consistent with previous research on behavioral mimicry (Soliz & Giles, 2014; Taylor & Thomas, 2008), but consistent with Richardson and colleague's (2014) finding. This discrepancy in findings could point to an important difference between interrogations and

other contexts. Because law enforcement officers are trained to build rapport during all interrogations, it is possible that the amount of linguistic matching stays consistent across interrogations, while other contexts (such as a date) would be mostly unstructured unlike interrogations. Although this maybe true, it is also unlikely since matching also depends on the suspect, who may disengage at any point during the interrogation because s/he feels threatened, lowering LSM.

A more realistic explanation is that the conversation level measurement is too inaccurate for interrogations because of the constant changing of questions. At the beginning, the interrogator might be discussing the suspect's everyday life, while at the end s/he is accusing the suspect of stealing. That shift in questioning would most certainly change the conversational dynamics in all interrogations, resulting in a similar overall LSM score for all outcomes. Therefore, it may be more useful to analyze interrogations on a more detailed level, instead of looking at the interaction as a whole.

There are several ways that an interrogation can be analyzed other than at the conversation level. One way is to simply look at how linguistic matching changed between pre- and post-confession. There was a marginally significant difference between pre- and post-confession, showing a downward trend. This difference became even stronger when fillers were removed. Matching could be higher before a confession because the interrogator was actively engaging with the suspect in an attempt to gain cooperation. Once the suspect confessed, however, the interrogator became pleased with the outcome and disengaged slightly. On the other hand, the decrease in matching could be a result of the suspect disengaging after the constant pushing of the interrogator is

over. Interrogators in the US are trained to obtain confessions and that could be the reason for the drop in synchrony. With the interviewer constantly asking about the incident, moving from asking questions to making accusations, at some point the suspect would get overwhelmed and confess.

Just because a suspect confesses doesn't necessarily mean that s/he is being honest the whole time. In fact, it was clear that there would at least be some individuals that would attempt to deny the allegations, but ultimately break and confess. Out of the 32 confessions, 11 were confessions that started out as lies. The results show that when initially deceptive confessions were compared to honest confessions, pre-confessions still differed significantly from post-confessions for both types. More interestingly, when looking at the pre-confession LSM scores, those who were initially deceptive didn't differ significantly from the fully honest confessors. This could be because at this point in the interrogation, those who were lying were attempting to do the same thing the honest confessors were – that is, present themselves as believable by engaging with the interrogator. Liars and non-liars had the same goal when being questioned about something, to be believable, and since both groups had a common motive, their linguistic matching behavior was similar. Also, unlike the individuals who lied all the way through the interview, the liars that confessed could be cognitively similar to those who honestly confessed in that they find it difficult to lie.

Even though there was a difference between pre- and post-confession, a temporal analysis of the transcripts paints a clearer picture of how the interrogations progressed. After splitting the transcripts into 5 parts, it was found that only the beginning of the

interrogations displayed significantly different linguistic matching between lies and confessions. Specifically, LSM for lies was higher than confessions. Linguistic matching at the beginning of an interrogation constituted a predictor (albeit a weak one) of the outcome. What's more is that more matching occurred during a deceptive conversation. This could be because liars were trying excessively hard to convince the interrogator that they were telling the truth, which resulted in them engaging more.

However, when comparing the same stage of the interrogation between liars that confessed and liars that didn't, liars who confessed had significantly *lower* matching than liars who didn't, but they didn't differ from honest confessions and non-confessions. This is curious because the two groups of liars differed so much from each other, but not the other outcomes. This could be explained by the fact that liars who confessed in the end were never too dedicated to lying in the first place, they just did it to protect their partner, but weren't too concerned with keeping them out of trouble. This is a similar conclusion to why deceptive pre-confessions didn't differ significantly from honest pre-confessions.

When looking at mimicry at the utterance level, it was expected that interrogator-led conversations would be more likely to end in a confession. The present findings did not support this prediction, which was derived from Richardson and colleagues (2014). In fact, the analysis showed no difference in outcome when the interrogator led or when the subject led the conversation. Note that although the researchers found a significant interaction between speaker leadership and outcomes, the difference was quite small. It's possible that an overall leader wasn't apparent because leadership changed throughout the conversation. For example, at the beginning the interrogator might have lead because

their task was to interview, which required them to ask all of the questions. Once the interview got going, the interrogator might have let the suspect take control in order to make them feel comfortable enough to confess. This is similar to how interrogators are trained, where they are expected to be dominant at the beginning of the interview, but then step back and let the suspect talk.

This inconsistent finding may also be because of the difference in expertise between local police and professional interrogators. Local police may be more likely to have variation amongst themselves when it comes to questioning strategies as result of different training, while professional interrogators are taught a *more* standardized procedure that is consistent between interrogations. The advantage of having a fixed procedure is that it controls for deviations in questions that would elicit undesirable behavior, such as a question that may cause an honest suspect to appear guilty (Levine et al., 2013).

LIMITATIONS

Analyzing professionally conducted interrogations can be very useful for understanding the utility of rapport in an investigative setting, and linguistic mimicry does seem to reflect this on a sub-conversational level, but these results need to be considered with caution. First of all, the group sizes were extremely different, which makes the results less robust. This is hard to control for when interrogators are allowed to question subjects freely. On the other hand, the ability to question the subjects, rather than passively observation as in so much previous research (Bond & DePaulo, 2006), allows the interrogator to adapt and explore the situation from a different angle. The

different group sizes, although they may have affected the results, only reflect the overwhelming success the interrogators had in the interview room.

There are two ways that groups sizes can be equalized in this type of setting. First, the number of overall interrogations can be increased, which may only result in the same differences between group sizes, just with more subjects per group. Even if this is the case and there are still unequal sizes, the larger sizes will help create more accurate distributions. Second, and much more undesirable, is to have interrogators conclude their questioning at a predetermined time. Doing this may increase the number of lies because it will keep interrogators from continually probing until they get a confession. To explore this more, word count was compared between outcomes and although the differences were not statistically significant (most likely because of the different group sizes) there did seem to be some discrepancy between outcomes. Specifically, interrogators seemed to talk more with those who were being deceptive than those who were being honest. This could either be because the liars were more transparent as a result of the questions they were asked, which is supported by previous research (Levine et al., 2010), or because interrogators tend to question longer when they don't get a confession. The former is more plausible because the length of honest non-confessions didn't differ much from honest confessions, but were somewhat shorter compared to deceptive non-confessions and initially deceptive confessions.

So why were these interrogators so successful at getting confessions? One possibility is that it could have been because of subject suspicion. When studies attempt to induce deception, most of the time it is a direct request given to the subjects, which

means that they are aware that it is a part of the experiment. In the current dataset, subjects were not aware that they would have the opportunity to lie, making their decision to do so completely theirs. The issue is that some individuals explicitly mentioned during their interviews that they were aware of the manipulation, which could have affected their choice on whether to lie or confess. For example, a subject that was aware that s/he would have an opportunity to cheat would feel less pressure to lie in order to protect her/himself and her/his partner, and ultimately confess. The results did not support this possibility. However, suspicion could have also played a role in whether the subject decided to cheat or not, which is impossible to test with the current dataset. Even if that was the case, the number of cheaters (n = 38) and non-cheaters (n = 45) was nearly equal, meaning that the large difference between confessions and lies had to be because of the interview, not the choice in cheating.

The last limitation observed in this study was the way the interrogators presented the cheating opportunity during the interview. This had the least potential to influence the outcome of the interview compared to the limitations mentioned above, but nonetheless could have had an impact of some sort. It was observed that when certain interrogators would start questioning the subject about the opportunity to cheat, they would mention that cheating has frequently happened in the past. The problem with mentioning the prevalence of cheating is that it suggests that it is a frequent occurrence, which implies that the cheating opportunity is planned. It's unclear if subjects noticed this, but it could have made the subjects more suspicious, which made them more willing to confess because they would know that they wouldn't be able to get away with lying.

Unfortunately, there was no way of controlling for this issue because mentioning past behavior is a technique the interrogators use to highlight the commonality of cheating, essentially minimizing the undesirability of it and increasing the possibility of a confession.

Implications and Future Directions

Although rapport is considered an important catalyst for a successful interrogation, linguistic matching doesn't seem to fully reflect this effect. This does not necessarily mean that rapport isn't important, but that engagement seems to be similar between deceptive and honest confessions and non-confessions, at least at the conversation level. When examining mimicry on a more detailed level, patterns started to emerge. LSM was higher before a confession, compared to after, possibly highlighting disengagement by the interrogator or suspect. Additionally, engagement at the beginning of the interrogation weakly predicted whether a suspect would lie throughout the entire interrogation. Knowing these differences can aid law enforcement in determining if a suspect will lie throughout the interrogation or not. This is important because it can help interrogators determine the costs and benefits of continuing the interrogation. For example, recording and analyzing the initial stages of an interrogation could highlight an overly engaging suspect, which could mean that s/he is being deceptive and that s/he is not going to confess, giving the investigators an opportunity to take a different course of action.

Besides the contributions to law enforcement, the findings here are important for deception research as well. Similar to other findings on deceptive conversations

(Hancock et al., 2008), it seems that there was a difference between liars and truthtellers in terms of LSM, with liars having a higher linguistic matching compared to truth-tellers. This difference wasn't observed for all liars, but only those who lied throughout the whole conversation. This could be because these types of liars are mentally prepared to stick to their story. It could also highlight a form of cognitive consistency, whereby these individuals just cheated and therefore feel the need to stay consistent by continuing the con by lying. Also, they could be engaging in impression management, by protecting their moral image by lying about cheating. This could also be true for those who initially lied and ended up confessing in the end, but impression management for this group might not be as important as protecting their self-image (e.g. I'm an honest person).

So why would liars display more linguistic matching than other groups? It could be because a successful lie entails continuously engaging with the interrogator in order to seem more honest. Now this doesn't necessarily mean that the liar is aware of this, but the ultimate goal of a liar is to seem honest, and this overly engaging behavior could be a result of overcorrection on the liar's part. Although it doesn't seem to have an effect on deception detection accuracy in this study, overly engaging individuals might seem more honest to the passive observer. Previous research has already shown us that people see behavioral disfluency (e.g. stutters, eye gaze aversion, inconsistent speech) as an indicator to deception (The Global Deception Research Team, 2006; Vrij & Taylor, 2003), which would make sense why someone would try to correct for this by engaging more with his/her conversational partner. It is important to point out that the linguistic

mimicry is only a byproduct of engagement, and is not consciously controlled by either speaker.

Future research on the topic of behavioral mimicry in investigative interviewing and deception detection should focus more on the effect mimicry has on deception detection accuracy. Understanding how perceived engagement can affect deception detection can help interviewers, both criminal and organizational, control any bias that maybe present. For example, if an observer tends to equate high engagement with honesty s/he might be less accurate at detecting lies compared to truths.

Also, mimicry should be explored more deeply in relation to deception as a whole. The current study found some evidence that deceptive individuals seem to have different linguistic matching compared to honest individuals. This can be further explored in non-interrogative contexts such as interactions between romantic couples. Do liars always match their conversational partners more than truth-tellers, no matter the context? It may also be possible that skilled liars engage more with their conversational partner, while bad liars disengage, resulting in lower linguistic matching. Knowing this can expand the knowledge on deception past simple deceptive cues and help us understand how behavior changes in the context of a dyadic interaction.

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